

An Essay
on
The Pathology of Tubercles,
Respectfully submitted to the
Faculty
of the
Homeopathic Medical College
of
Pennsylvania.

On the first day of February one
thousand eight hundred fifty seven.

By
Jeremiah M. Pierson
of
Pennsylvania

In certain conactions of the system, there is exuded a peculiar protein substance or blastema, which from the roundish form it usually assumes, is denominated tubercle. The state of system, which tends to a copious deposition of this tuberculous matter, is designated as the tuberculous, seropulous, or strumous diathesis.

The affection commonly known under the name of serofula, or struma, is by most pathologists, (and I believe the best) considered very similar to, if not identical,

with tuberculosus; or in other words, they do not acknowledge any difference in the elementary constituents, of a scrofulous deposition in a subcutaneous lymphatic gland, and that of a pulmonary tubercle. That is, they are identical, in all respects, except, the position, or part of the body which they occupy.

Tubercles, may show themselves in different parts of the system at the same time, or as is more commonly the case, they may be confined to one

particular part of the body,
and by the changes which
their substance undergoes,
give rise to local affections,
which have received dif-
ferent names, in reference
to their position, or locality.
Thus, the morbid affection
which they produce in the
lungs, is named pulmonary
phthisis; and when in the
bones, they produce white-
swellings, caries, and necrosis;
when in the peritoneum, ch-
ronic peritonitis; and in
the mesenteric glands, tabes
mesentericae &c.

Two varieties of tubercles,

in some respects very distinct, have been described by authors. These are, the simple fibrinous tubercle, or gray semi-transparent granulations of Laennec, and the fibrino-croupous, or yellow tubercle.

The gray variety, seems to have been most studied. The investigations, that have been instituted, and the observations that are recorded, relate more exclusively to this variety, ^{of tubercles,} than to all other tuberculous formations.

In most theories ad-

vanced, in relation to
tuberculosis, the gray
granulations, have been
taken as the typical form,
of all tuberculous deposits,

There are however, many
varieties of tubercles, besides
the gray, translucent gra-
nulations, and the yellow
tubercle. Each variety be-
ing, the product of a
modification of the dyscrasia,
or state of system, which
leads to their production.
As it would be unprofitable,
and almost an interminable
task, to attempt a descrip-
tion of these varied forms,

I will limit myself, in what I shall say, to the two before-mentioned cardinal varieties, the gray granulations, and ^{the} yellow tubercle. I will first enumerate some of the characteristics which belong to tubercles generally, and then, attempt a description of the above mentioned forms.

First then, all tuberculous depositions, consist essentially, of an exudation of a solidified protein substance, or blastema, which remains at the lowest point of development, — that is,

it continues in that
crude condition, determin-
ed by the process of consol-
idation. This crude con-
dition, or low state of devel-
opment, is essential, and
indispensable, to constitute
tubercle, and also, to distinguish
it from other solidified ex-
udations. The low state of
development, is so essentially
characteristic of the tuberculous
exudation, that any other so-
lidified blastema, no matter how
nearly it may approach the tu-
berculous exudation, in all
other respects, loses its
identity, the moment

it takes on the least transformation towards a textural arrangement.

Vasculosity, is as foreign to the true tubercle as organization. Still, it is asserted, that blood-vessels are sometimes found in tubercles. I can readily conceive how this may seemingly occur, in two ways. In one case, the tubercle being deposited in a vascular texture, may be aggregated, around, a bloodvessel, already existing in the texture. In this case,

it would be evident,
that the vessel penetra-
ted the tuberculous mass,
but in reality, it does
not belong to the tuber-
culous deposition.

In the second instance,
the blood-vessel may be
newly formed, from
an organizable blastema
thrown out with the tu-
berculous exudation, and
in this way, might rea-
dily be incorporated with
the tuberculous deposition,
Neither of these conditions
however, are often found
to exist. In the former

case, when the tuberculous matter is aggregated around a blood vessel, the vessel is almost invariably obliterated. The truth is, the further the tubercle, the further it is removed from all traces of vascularity.

In the original deposition of tubercles, the gray granulations, are generally found to take the precedence. This form, in its earliest stage appears as scattered, or collections, of minute, roundish, shining, translucent, solid, homogeneous, granules.

varying in size, from
a millet seed, to that of
an ordinary pea, or cherry
stone, and presenting va-
rious shades of a pearly-
gray color. When placed
under the microscope,
they display a number
of elementary constituents,
consisting of granules of
various magnitude; nu-
cleus formations of various
shapes and phases; nuclei;
and nucleated cells, in a
misshapen, disorderly,
and broken down condition;
and an unformed, inter-
vening, hyaline, or pellu-

cid, basement mass; which forms the binding medium for the above mentioned elements. This tubercle, when exuded pure, and entirely free, and independent, of the fibrino-crucious exudation, undergoes the following metamorphosis, which pathologists term decadence or obsolescence. This takes place in the following manner. After remaining for a longer or shorter space of time, in the crude, solid, translucent state, in which it was deposited.

it passes into a toughish, softish, uniformly compressible substance.

After continuing in this semi-liquefied condition for a certain length of time, it loses its moisture, and becomes again condensed, and shrivels into a tough, amorphous, corneous substance. In some instances, this change is accompanied with a bony deposition, and the tubercle becomes partly ossified. The final result of this change is the decadence of the tubercle.

which renders it sub-
versive of all further
change. This variety of
tubercle, when exuded
pure, as before mentioned,
unmixed with other tuber-
culous exudations, never
softens. The metamorpho-
sis above described, is what
properly belongs to this
tubercle. When it is ob-
served to soften, it is
always more or less mixed
with some one of the
fibrino-croupous exudate.

Having briefly noticed
the manner of deposition,
the metamorphosis, and

death, or obsolescence of
the gray translucent gran-
ulations, or simple fibrin-
ous tubercle. I will now
pass on to a cursory con-
sideration, of the yellow
or fibrino-croupous tubercle.
In a sparse deposition
of these tubercles, they may
occur much in the
same manner and size,
as the former variety.
This condition however,
does not often obtain. The
morbid state of systems
which leads to the depo-
sition of this variety, is
generally more acute,

that is, they are thrown
out more copiously,
In this acute diathesis,
or tuberculous cachexia,
as it is sometimes called,
they are deposited in
roundish nodules, or
perhaps more frequently
in irregularly branched
masses, the size of a pea
or larger. Usually, a va-
riety of sizes, exist at the
same time, one author
says he has dissected them
out, as large as hen's eggs.
On membranaceous surfaces,
this variety, is generally de-
posited in layers of various

thickness. One of the points of distinction, between this variety of tubercles, and the gray translucent granulations, is the fact, that the former are invariably, from the beginning, opaque, while the latter are as invariably translucent. Under the microscope they present much the same formation as the gray granulations, with one exception, In this variety the intervening basement mass, is opaque, in place of pellucid, as in the former variety. The nucleated formation, I mentioned when speaking of

the gray granulations, I think, is identical with the proper tuberculous granulated corpuscles, spoken of by some authors.

The metamorphosis proper to this variety, is softening, and is, what constitutes its malignancy, as it often leads to inflammation, and ulceration, of the texture in which it is embedded. When this takes place, it constitutes what is denominated tuberculous phthisis. This however, is not always the termination of the softening

process. It may end in
what is termed cretacea-
tion. The softening pro-
cess is effected in the fol-
lowing manner. As the
tubercle increases in age,
it becomes in various de-
grees (from in to out,) yellow,
may be elastic or friable,
of a granular fracture, or
sometimes fibrous, and of
a lardaceous, curd-like as-
pect. The tubercle now
swells up, and becomes
of a still more loosish con-
sistence, it increases in
volume, and is readily
broken up. It is now

changed, from the opaque,
to a yellowish, glutinous,
fatty, tenacious, substance,
like melted cheese, and
finally liquefies, to a whey
like fluid, in which float
flocculent particles, the
remains of the incomplet-
ely broken down tubercle.
In this condition, it const-
itutes that important sub-
stance, denominated tuber-
cle-pus

When the tubercle occupies
the parenchyma of the
lungs, and has changed to
the condition above des-
cribed, it constitutes what

is technically termed,
a vomica. The irritating
properties of the confined
matter, often produces
inflammation in the sur-
rounding textures, which
frequently ends in ulcera-
tion, and in this way
opens a communication,
between the softened tuber-
cle, and the adjacent bron-
chial tubes; and as the mat-
ter escapes through this
opening into the bronchial
tubes, it is expectorated,
leaving a cavity. When
this complete solution
of a tubercle takes place,

upon membranous expansions, particularly the mucous membrane, it determines, in the membrane a small gap, which is designated, as the primitive tubercle ulcer.

This is the point, where inflammation commences to play an important part. But for the fresh crops of tubercles, produced by inflammation in the vicinity of the primitive cavity, or ulcer, the consumption of textures, would remain inconsiderable. The rapidity, in which these crops

are produced, is proportionate with the softening and corrosion of the preceding one. Not infrequently, a number of cavities, or ulcers, merge into a single one, presenting a cavity, or ulcer with irregular, jagged edges.

When this condition obtains, it is generally the product of an exalted tuberculous cachexia, and constitutes tuberculous phthisis of the organ implicated.

The yellow tubercle however, is not invariably thus malignant. In some in-

stances, in place of the
softened tubercle lead-
ing to inflammation
and ulceration, it may
terminate as before men-
tioned; in cretification.

It is effected as follows.

When the ^{tubercle} has changed to
the liquid condition, it
takes up the salt of lime,
and certain fats. progres-
sively thickening, into a
moist, unctuous, soap-like
consistence, and is even-
tually converted, into a
concrete mass, or mortar.

In this cretified condition,
it is no longer malignant.

Most authors that I have examined, teach, that the gray granulations, lose their transparency, become opaque, of a yellowish color, and eventually deliquesce, or soften. This opinion, to my mind, is erroneous, to say the least I can of it. As I have before remarked, it is only, when the blastema of this tubercle, is exuded in combination with that of some one of the fibrino-croupous varieties, that it has the capacity to soften. Now this combined exudation, is not thrown out in the in-

cipient stage of tuberculosis;
it is the product of a more
vitiated state of system, or
more marked diathesis, I
believe, that it is only in con-
nection with the above cir-
cumstance, that the gray
granulations, have ever been
observed to soften. The

There is also another point,
in relation to the phenom-
non of softening, held by
many authors, from which
I respectfully dissent. They
allege, that the tuberculous
deposition, acts as a foreign
substance in the impli-
cated texture, that it ex-

ites irritation, and induces inflammation in the surrounding textures, and that this irritation and inflammation, is extended to the tuberculous substance; and that it is, by the inflammatory action, converted into what they call tubercles. Whether the inflammation is communicated by continuity, or contiguity, they do not say, and I do not know

That the above view is incorrect, appears evident from the following considerations. When tubercle is engaged in incipient softening, there is no trace

of inflammation discoverable
in the surrounding texture.

And again, the softening is
observed to commence, gen-
erally, in the centre, or in-
terior part of the tubercle.

And lastly, as I have before
observed, tubercles are almost
entirely destitute of blood-
vessels, and equally as des-
titute of organization. In
view of the above facts, even
admitting the irritation
caused by the tubercle, ca-
pable of inducing inflamma-
tion in the surrounding
textures, how can the in-
flammation, soften the

tuberculous mass^s, I do not believe, that the implicated texture, has anything to do, with the softening of tubercle; even admitting it to be in a state of inflammation. I regard the phenomenon of softening, as a spontaneous metamorphosis, pertaining to this peculiar form of tubercle; and is the result of a law of its constitution, which is effected, by a chemical change in the component elements of the tubercle.

Much has been written by different authors, touching

the tuberculous habit, as
expressed in a delicate
construction of the soft parts;
rounded, graceful outline of
the face; exquisitely deli-
cate skin; extreme develop-
ment of the cellular, and
imperfect development of
the muscular tissues;
blond or auburn hair, eyes
projecting, humid, and blue,
tumidity of the nose, and
upper lip, and especially,
in what is called, the ph-
thisical build of the chest.
Now I do not consider
this habit, or physical
conformation, essential to

a copious deposition of
tubercles, Nor do I believe,
that they are limited, in
their growth or production,
to any one substructure,
to the exclusion of all
others. I have no doubt,
the tuberculous diathesis
may become acquired in
an individual, (regardless
of all physical conforma-
tion,) as a consequence of
deteriorating influences, op-
erating, both externally,
and internally; such as
close confinement, bad
food, insufficient clothing,
vitiated atmosphere, &c.

Tuberculosis to my mind,
is undoubtedly a constitu-
tional disease; either inher-
ited, or induced as above men-
tioned; which manifests it-
self primarily in the blood.
In consequence of this anom-
alous condition of the blood,
we have an exudation of
vitiated fibrin, which forms
the foundation or ground-
work of the gray and yel-
low tubercles. The difference
in the degree of impairment
of the exuded fibrin, causes
a like difference in the ^{nature of the} tu-
bercles. The gray granula-
tions, are insensibly thrown

out first, in the incipient stage of tuberculosis, accompanied perhaps, with more or less hyperemia; then as the constitutional vice becomes more exalted, the hyperemia, runs into complete inflammation, and in place of the gray granulations, there is thrown out, the yellow tubercle. Thus we have, the activity of the local affection, proportionate to the degree of constitutional depravity.

The views I have expressed in this essay, of the origin and progress

of tubercles, is not univer-
sally admitted I know, but
they are such, however, as
have appeared to me, from
a careful examination of
various authors, to be most
plausible. The opinions,
and conclusions, I have given,
have not been of self-origin.

The sources of my knowledge,
has been principally from
books, in addition, to what I
have derived, from hearing
lectures, and but little from
my own observation.